

Attorney Docket No.: TS1260 (US)

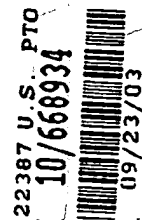
A Named Inventor/Application Identifier: Ari Van Zon, Robert Moene, Phillip E. Unger, Peter Arnoldy, and Eric J. M. De Boer

Express Mail Label No.: EV325949151 US

Title: PROCESS FOR MAKING A LINEAR ALPHA-OLEFIN OLIGOMER USING A HEAT EXCHANGER

Date: September 23, 2003

**UTILITY PATENT APPLICATION TRANSMITTAL**  
**UNDER 37 CFR 1.53(b)**



Commissioner for Patents  
Box Patent Applications  
P. O. Box 1450  
Alexandria, VA 22313-1450

1. ☒ This application is a(n):
  - a. ☒ Original
  - b. ☐ Continuation-in-part of Application Serial No. \_\_\_\_\_ filed \_\_\_\_\_
  - c. ☐ Divisional of Application Serial No. \_\_\_\_\_ filed \_\_\_\_\_  
☐ Applicant(s) elect the invention of Group/Species \_\_\_\_\_
  - d. ☐ Continuation of Application Serial No. \_\_\_\_\_ filed \_\_\_\_\_
2. ☒ Specification
  - a. ☒ Pages 14
  - b. ☒ Drawings, Total sheets 2
3. ☐ Oath or Declaration
  - a. ☐ Newly executed (original or copy)
  - b. ☐ Copy from a prior application  
☐ Please delete the following named inventors in the prior application: \_\_\_\_\_
4. ☒ Please amend the specification
  - a. ☐ By inserting before the first line:  
This is a ☐ continuation ☐ division ☐ continuation-in-part of Application Serial No. \_\_\_\_\_ filed \_\_\_\_\_, the entire disclosure of which is hereby incorporated by reference
  - b. ☒ By inserting before the first line:  
This application claims the benefit of U.S. Provisional Application No. 60/413,276 filed September 25, 2002, the entire disclosure of which is hereby incorporated by reference
  - c. ☐ Cancel claims \_\_\_\_\_
5. ☐ This application claims the benefit of Application Number \_\_\_\_\_ filed on \_\_\_\_\_ in \_\_\_\_\_ under 35 U.S.C. § 119, § 365(a), or § 365(b). (For originals)
6. ☐ Microfiche Computer Program (Appendix)
7. ☐ Recognize as an associate attorney \_\_\_\_\_, Registration No. \_\_\_\_\_

# DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

ATTORNEY'S DOCKET NO.  
TS1260 (US)

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name. I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **PROCESS FOR MAKING A LINEAR ALPHA-OLEFIN OLIGOMER USING HEAT EXCHANGER** the specification of which is attached hereto unless the following box is checked:

☐ was filed on \_\_\_\_\_ as United States Application Number or PCT International Application Number \_\_\_\_\_ and was amended on \_\_\_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

## PRIOR FOREIGN APPLICATION(S)

APPLICATION NUMBER	COUNTRY	DAY/MONTH/YEAR FILED
APPLICATION NUMBER	COUNTRY	DAY/MONTH/YEAR FILED

Priority  
Not Claimed

☐  
☐

I hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below.

APPLICATION SERIAL NO.	FILING DATE
60/413,276	September 25, 2002
APPLICATION SERIAL NO.	FILING DATE

I hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s) or § 365(c) of any PCT International application designating the United States, listed below and insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

APPLICATION SERIAL NO.	FILING DATE	STATUS-PATENTED, PENDING, ABANDONED
APPLICATION SERIAL NO.	FILING DATE	STATUS-PATENTED, PENDING, ABANDONED

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

NAME	ATTORNEY/AGENT	REGISTRATION NUMBER	TELEPHONE NUMBER
Donald F. Haas	Attorney	26,177	(713) 241-3356
NAME	ATTORNEY/AGENT	REGISTRATION NUMBER	TELEPHONE NUMBER
Richard F. Lemuth	Attorney	30,081	(713) 241-3716

Revised June 1995

## SEND CORRESPONDENCE TO:

**Donald F. Haas**  
c/o Shell Oil Company  
Intellectual Property  
P.O. Box 2463  
Houston, TX 77252-2463

PROCESS FOR MAKING A LINEAR ALPHA-OLEFIN OLIGOMER  
USING A HEAT EXCHANGER

Field of the Invention

The invention pertains to a process for making a linear alpha-olefin oligomer in a reactor comprising a liquid and a gas phase, comprising the steps of  
5 catalytically oligomerizing ethylene in the presence of a nickel, palladium, cobalt, titanium, zirconium, hafnium, vanadium, chromium, molybdenum, or tungsten complex, to the alpha-olefin oligomer with an average molecular weight of about 50 to about 350 under release of heat,  
10 and removing the heat with a heat exchanger.

Background of the Invention

Various catalysts and processes are known for the production of higher linear alpha olefins (for example W. Kaminsky and M. Arndt-Rosenau, Chemical Background in  
15 Applied Homogeneous Catalysis with organometallic Compounds, Ed. B. Cornils, W. A. Herrmann, 2<sup>nd</sup> Edition, Vol. 1, Ch. 2.3.1.1, page 213-230, Wiley-VCH 2002 and D. Vogt, Oligomerisation of ethylene to higher alpha-olefins in Applied Homogeneous Catalysis with organometallic  
20 Compounds, Ed. B. Cornils, W. A. Herrmann, 2<sup>nd</sup> Edition, Vol. 1, Ch. 2.3.1.1, page 240-253, Wiley-VCH 2002). The commercial processes afford either a Poisson or Schulz-Flory oligomer product distribution. In such a process, a wide range of oligomers is typically made.

25 For instance, British patent application GB 135,873 describes the preparation of C<sub>4</sub>-C<sub>20</sub> linear alpha-olefins by ethylene oligomerization in the presence of a catalyst composition comprising a divalent nickel salt, a boron hydride, and a tertiary organophosphorus compound.